REMARKS/ARGUMENTS

This letter is responsive to the Notice of Non-Compliant Amendment (37 CFR 1.121) mailed on March 17, 2005. Since the previous amendment, dated May 19, 2004, that was identified as non-compliant was a bona fide attempt to reply to a Non-Final Office Action, the Applicant submits that the current response has been timely filed to correct the sections of the previous response identified in the Notice of Non-Compliant Amendment. What now follows is the original Office Action Response of May 19, 2004 with status identifiers correctly shown.

Amendments to the Claims

By this response, there is now a total of 17 claims pending for this application. Accordingly, no excess claim fee is required. Claim 3 has been cancelled and new claims 15 to 18 have been added.

In this response, claims 1, 2, 4-6, 9-11 and 14 have been amended. Claims 4 and 5 have had their dependencies amended due to the cancellation of claim 3. Claims 5 and 6 have been amended to correct typographical errors in the claims as filed. In claim 5, the word "front" has been replaced by the word "rear" in the third line. In claim 6, the word "rear" has been replaced by the word "front" in two instances on line 2, the word "second" has been inserted before the phrase "front sealing portion" on line 2 and the word "front" has been replaced by the word "rear" on the third line. Further claim 2 has been amended by inserting the word "the" in two instances to properly refer to antecedents introduced in claim 1.

Claim 11 has also been amended to correct typographical errors, In line 4, the word "a" was inserted before the phrase "rear side" to properly introduce an antecedent. Further on line 4, the word "surfaces" was replaced by the word "sides" to properly refer back to an antecedent. Further, in the sixth and seven paragraphs of claim 11, the phrases "at least one first slot" and "at least one second slot" was replaced by the phrases "the first slots" and "the second slots" respectively to properly refer back to antecedents.

Amendments to the Drawings:

The attached drawing sheets include one set of replacement drawings for Figures 4 and 8 and a set of annotated sheets showing the changes made to Figures 4 and 8. Support for the Figure amendments is on line 24 of page 17 and lines 24-32 of page 18 of the application as filed.

With regards to Figure 4, the leader line for label 210 has been changed to better describe the extension element associated with aperture 140. Also, the label 210a has been added with a leader line to indicate the extension element associated with aperture 141.

With regards to Figure 8, the leader lines for labels 240a and 240 have been changed to better describe the extension elements associated with apertures 140 and 141 respectively.

Attachment at end of paper: Replacement Sheet
Annotated Sheet Showing Changes

Claims 1, 2 and 4 have been amended to replace the feature "at least one slot" with the feature "a plurality of slots". Support for this amendment is in Figures 3-5, and 7-9 as filed. Claim 4 has been further amended by specifying that the plurality of projections are offset from the corresponding aperture for providing at least one of flow channels between the corresponding apertures and the plurality of slots, and structural support. Support for these claim amendments are in Figures 4, 5, 8 and 9.

Claims 1, 10, and 14 have been amended to recite that there are at least two apertures for a reactant gas for supply to the chambers that provide for reactant gas flow adjacent the membrane electrode assembly. These claim amendments are supported by the reactant gas flow channels shown in Figures 3 and 7 as well as paragraph 4 on page 1 and 2 of the application as filed which recites the configuration of a fuel cell.

Claims 1 and 14 have also been amended to more particularly recite the configuration of the extension with respect to the corresponding aperture and the plurality of slots. In particular, these claims now recite that for each aperture associated with the reactant gas that flows along the reactant gas flow channels, there is a plurality of slots that are disposed adjacent to the extension on the rear side of the flow field plate and adjacent to the reactant gas flow channels on the front side of the flow field plate to provide fluid communication therebetween. Claim 10 has been amended in a similar fashion while reciting the feature "at least one slot". Support for these claim amendments are in Figures 4, 5, 8 and 9 of the application as filed.

Claim 9 has been amended by specifying that the first extension is disposed between the first aperture and the corresponding first slots for providing fluid communication therebetween. Likewise, claim 9 has been amended by specifying that the second extension is disposed between the second aperture and the corresponding second slots for providing fluid communication therebetween. Support for these claim amendments are in Figures 4, 5, 8 and 9 of the application as filed.

Claims 10 and 11 have also been amended by reciting that the plurality of projections are offset from the corresponding aperture. Support for these claim amendments are in Figures 4, 5, 8 and 9 of the application as filed.

Claim 14 has also been amended to recite that each of the plurality of slots is connected to more than one of the reactant gas flow channels. Support for this amendment is in Figures 3 and 7 of the application as filed.

Claim 15 has been added to recite that each of the plurality of slots is connected to more than one of the reactant gas flow channels. Further, claims 16 and 18 have been added to claim that each of the first slots is connected to more than one of the first reactant gas flow channels and each of the second slots is connected to more than one of the second reactant gas flow channels. Support for these claims are in Figures 3 and 7 of the application as filed.

Claim 17 has been added to claim that each first (second) extension is provided with a plurality of projections that are offset from the corresponding first (second) apertures for providing at least one of flow channels between the corresponding first (second) apertures and the first (second) slots and structural support. Support for this claim is in Figures 4, 5, 8 and 9 of the application as filed.

Amendments to the Specification

The paragraphs in the Summary of the Invention section have been amended to comply with amendments made to claims 1 and 9. Accordingly, the Applicant submits that no new matter has been added by these amendments.

Paragraphs 66 and 88 have been amended by stating that there can be at least one transfer slot 178 and at least one transfer slot 180. These amendments are supported by the claims as originally filed. The Applicant reminds the Examiner that the claims as originally filed are part of the description of the invention (U.S. Code, Title 35, Part II, Chapter 11, Section 112, 2nd paragraph) and can be used as the basis for amendments

made to the description or the Figures (Section 608.01(1) of MPEP). Accordingly, the Applicant submits that no new matter has been added by these amendments.

Objections made to the Drawings

In paragraph 2 of the Office Action, the Examiner argued that the drawings must show every feature of the invention as specified in the claims. In particular, the Examiner stated that the extension extending on the rear side of the flow field plate for each of the apertures as recited in claim 1 must be shown.

In response, the Applicant submits that the extensions recited in amended claim 1 are for the apertures that provide or remove the reactant gas that flows along the reactant gas flow channels. These extensions are clearly shown in Figures 4 and 8 as filed (these extensions are shown in greater detail in Figures 5 and 9). In Figure 4, elements 210 and 210a are aperture extensions that are respectively associated with apertures 140 and 141 that provide reactant gas for flowing in the reactant gas flow channels on the anode flow field plate. Support for this feature is also in the text on line 25, page 17 of the application as filed. Similar aperture extensions are shown as elements 230 and 230a on Figure 9. These aperture extensions are respectively associated with apertures 136 and 137 which provide reactant gas for flowing in the reactant gas flow channels on the cathode flow field plate. Support for this feature is on line 24, page 18 of the application as filed.

In paragraph 2 of the Office Action, the Examiner also argued that the drawings show extensions (e.g. 210 in Figure 5 and 230 in Figure 9) around the apertures that are part of the "front" side of the flow field plates where the flow channels are located. The Examiner further argued that the previous version of claim 1 is interpreted as "for each of the apertures, at least one slot is associated with the aperture, the at least one slot extending through the flow field plate from the back side to the front side thereof; for each of the apertures, an extension is located between the aperture and the at least one slot such that gas flows from the rear side of the flow field plate along the extension and

through the at least one slot to the reactant gas flow channels. The Examiner then argued that a drawing correction or corrected drawings are required to avoid abandonment of the application.

In response, the Applicant respectively submits that the Examiner has misinterpreted Figure 5 in that the Examiner believes that Figure 5 depicts the front side of the anode flow field plate. In actual fact, Figure 5 depicts the rear side of the anode flow field plate in accordance with the features recited in claim 1. More specifically, Figure 5 shows a plan view, on an enlarged scale of the portion of Figure 4, showing one supply aperture in greater detail. Further, Figure 4 shows rear views of an anode bipolar flow field plate (see lines 19-22 on page 8 of the application as filed). Further, claim 1 has been amended to state that slots are provided for each of the apertures that supply reactant gas that flows along the reactant gas flow channels. Accordingly, the Applicant submits that Figure 5 is correct, claim 1 corresponds to some of the features depicted in Figure 5 and that no correction is required.

In paragraph 3 of the Office Action, the Examiner objected to the drawings and argued that the drawings must show every feature of the invention specified in the claims. In particular, the Examiner argued that the first extension on the rear side of the first flow field plate and the second extension on the rear side of the second flow field plate as recited in claim 9 must be shown or the feature(s) cancelled from the claim.

In response, the Applicant respectively submits that Figure 4 shows extensions on the rear side of an anode flow field plate associated with some of the apertures. This can be considered as a first extension on the rear side of a first flow field plate. Further, Figure 8 shows extensions on the rear side of a cathode flow field plate associated with some of the apertures. This can be considered as a second extension on the rear side of a second flow field plate. Further, Figure 1 shows a fuel cell assembly which comprises a stack of fuel cells. A single fuel cell comprises an anode flow field plate and a cathode flow field plate with a membrane electrode assembly (MEA) therebetween and a gas diffusion media between each flow field plate and the MEA (see lines 27 to 32 on page

1 of the application as filed). Accordingly, the Applicant submits that there is support in the application as filed for the features recited in claim 9.

In paragraph 3 of the Office Action, the Examiner further argued that the drawings show extensions (e.g. 210 in Figure 5 and 230 in Figure 9) around the apertures that are part of the "front" side of the flow field plate where the flow channels are located and that the extensions are already in communication with the reactant gas flow channels because they are part of the "front" side of the flow field plate as shown in the Figures. The Examiner further argued that a drawing correction is needed.

In response, the Applicant respectively submits that the Examiner has misinterpreted Figures 5 and 9. The Applicant refers to previous submissions made for Figure 5 in which the Applicant explained that Figure 5 clearly shows an enlarged portion of the rear of the anode flow field plate. In addition, the Applicant submits that Figure 9 shows a plan view on an enlarged scale of a portion of Figure 8 and that Figure 8 shows the rear of a cathode flow field plate (see lines 28 to 31 on page 8 of the application as filed). Accordingly, the Applicant submits that Figures 5 and 9 are correct and that no correction is required.

In paragraph 4 of the Office Action, the Examiner argued that the drawings must show every feature of the invention specified in the claims. In particular, the Examiner argued that extensions extending on the rear side of the flow field plate for each of the apertures as recited in claim 10 must be shown or the feature(s) canceled from the claim(s).

In response, the Applicant respectively submits that the drawings do show extensions extending on the rear side of the flow field plate for each of the apertures that provide or remove the reactant gas that flows in the reactant flow channels on the front sides of the flow field plates as recited in amended claim 10. These extensions may not have been clearly labeled in the Figures as filed. However, the Applicant submits that amended Figures 4 and 8 now clearly show this feature. In particular, originally filed Figure 4 had

an incorrect leader line from label 210. This has now been corrected to clearly show the location of the aperture extension in Figure 4. Support for this amendment is in Figure 5 as filed and line 24 on page 17 of the application as filed. Reference label 210a has been added to show the extension associated with aperture 141 on the bottom left corner of Figure 4. With regards to Figure 8, shown therein are aperture extensions 230 and 230a for apertures 136 and 137 respectively. The Applicant has corrected the leader lines to more clearly show the location of the extension. Support for these features is in the text on lines 24-32 on page 18 of the application as filed. Further, the Applicant submits that apertures 140 and 141 for the flow field plate shown in Figures 4 and 5, and apertures 136 and 137 for the flow field plate shown in Figures 8 and 9, are the only apertures that are used for providing or removing reactant gas in those flow field plates (i.e. one flow field plate provides for the flow of a fuel and the other flow field plate provides for the flow of an oxidant). Accordingly, the Applicant respectively submits that the features recited in claim 10 are supported by the Figures.

In paragraph 4 of the Office Action, the Examiner also argued that the drawings show extensions (e.g. 210 in Figure 5 and 230 in Figure 9) around the apertures that are part of the "front" side of the flow field plate where the flow channels are located.

In response, the Applicant respectively submits that the Examiner has misinterpreted Figures 5 and 9. The Applicant refers back to previous submissions made above which clearly explain that Figures 5 and 9 depict an enlarged view of a portion of the rear of a flow field plate. Accordingly, drawing corrections do not need to be made.

In paragraph 5 of the Office Action, the Examiner argued that the drawings must show every feature of the invention specified in the claims and therefore, a first extension extending on the rear side thereof and a second extension on the rear side thereof as recited in claim 11 must be shown or the feature(s) cancelled from the claims.

In response, the Applicant submits that claim 11 recites "... first flow field plate ... for each of the first apertures thereof, on the rear side thereof, a first extension" and "...

second flow field plate ... for each of the second apertures thereof, on the rear side thereof, a second extension". The Applicant respectfully submits that support for these features has been clearly shown in the submissions made by the Applicant above. Firstly, the Applicant has explained that based on Figures 4 and 8, there is support for extensions associated with each aperture that provides reactant gas to or removes reactant gas from the reactant gas flow channels. Secondly, the Applicant has explained that based on Figures 1, 4 and 8, there is support for a fuel cell assembly with a first flow field plate and a second flow field plate. Accordingly, the Applicant submits that these features do not have to be removed from the claims and that the drawings do not have to be corrected.

In paragraph 6 of the Office Action, the Examiner argued that the drawings must show every feature of the invention specified in the claims and therefore, an extension extending on the rear side of the flow field plate for each of the apertures as recited in claim 14 must be shown or the feature(s) cancelled from the claims.

In response, the Applicant respectively submits that there is support for these features recited in claim 14. The Applicant refers to previous submissions made above which clearly show that for each aperture that provides or removes reactant gas for flow along the reactant gas channels, there is an associated extension on the rear side of the flow field plate. Accordingly, the Applicant submits that these features do not have to be removed from claim 14 and that the drawings do not have to be amended.

Objections made to the Specification

In paragraph 7 of the Office Action, the Examiner objected to the disclosure and argued that on page 7, in paragraph 23, the statement that "for each of the apertures, an aperture extension extending on the rear side of the flow field plate" does not appear to be illustrated in the drawings.

In response, the Applicant submits that the apertures are qualified as being apertures for supplying or removing a reactant gas that flows along the reactant gas flow channels

as now specified in amended claim 1 and reflected in amended paragraph 24 (see line 10-11 on page 7 of the application as filed). Further, the Applicant has made submissions above to explain that Figures 4 and 8 clearly show that each aperture that is used for providing or removing reactant gas has an associated extension. Accordingly, the Applicant respectively submits that this entry in the application is correct and is shown in the Figures.

In paragraph 7 of the Office Action, the Examiner objected to the disclosure and argued that on page 8, paragraph 29, the statement that "on the rear side thereof, a first aperture extension" does not appear to be illustrated in the drawings.

In response, the Applicant submits that the first aperture extension is clearly illustrated based on Figures 1, 4 and 5, text on lines 27 to 32 on page 1 of the application as filed, and line 29, page 10 to line 2, page 11 of the application as filed, and refers to the submissions made above to support this point. Accordingly, the Applicant respectively submits that this entry in the application is correct and is shown in the Figures. Further, the amendment made to paragraph 29, based on Figure 4 as filed, more clearly states the location of the extension.

In paragraph 7 of the Office Action, the Examiner objected to the disclosure and argued that on page 8, paragraph 30, the statement that "on the rear side thereof, a second aperture extension" does not appear to be illustrated in the drawings.

In response, the Applicant submits that the second aperture extension is clearly illustrated based on Figures 1, 8 and 9, text on lines 27 to 32 on page 1 of the application as filed, and line 29, page 10 to line 2, page 11 of the application as filed, and refers to the submissions made above to support this point. Accordingly, the Applicant respectively submits that this entry in the application is correct and is shown in the Figures. Further, the amendment made to paragraph 30, based on Figure 8 as filed, more clearly states the location of the extension.

Objections made to the Claims

In paragraph 8 of the Office Action, the Examiner objected to claim 5 because in line 1, the word "disclaimed" should be "claimed".

In response, the Applicant has amended claim 5 to correct this typographical error.

Claim Rejections – 35 USC S. 112

In paragraph 10 of the Office Action, the Examiner rejected claims 1-8, 10 and 14 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The Examiner argued that the claim(s) contains subject matter which was not described in the specification at the time the application was filed. In particular, the Examiner argued that the limitation "the flow field plate having a front side, for defining chambers with another complementary flow field plate and a membrane electrode assembly" does not appear to be in the original disclosure and that it is unclear how one side (the front side) of the flow field plate can define more than one chamber. The Examiner further said that claims depending from claims rejected under 35 USC 112, first paragraph 2-8 are rejected for the same reason.

In response, the Applicant respectively submits that the limitation "the flow field plate having a front side, for defining chambers with another complementary flow field plate and a membrane electrode assembly" is supported in the original disclosure. In particular, this limitation refers to two types of chambers. The first type of chamber is made with the membrane electrode assembly (identified with label 216 in Figure 3) by the front face 132 of the anode flow field plate which are channels for reactant gas flow (see lines 3 to 8 on page 11 of the application as filed). In a similar fashion, the cathode flow field plate has a front face that provides channels for reactant gas flow with respect to the membrane electrode assembly (see Figure 7). In both cases, the reactant gas flow in the channels also flows adjacent to the membrane electrode assembly which is sandwiched between the two flow field plates and thus adjacent to each flow field plate. The second type of chamber is made between the two flow field plates when a fuel cell element is assembled. These chambers provide for a network of sealing grooves to seal

the fuel cell assembly (see line 16 on page 11 to line 22 on page 12 of the application as filed and Figures 3 and 7). There are also many other instances of the network of sealing grooves described in the application.

In paragraph 12 of the Office Action, the Examiner rejected claims 1-14 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. The Examiner argued that in claims 1, 10 and 14, the limitation "the flow field plate having a front side, for defining chambers with another complementary flow field plate and a membrane electrode assembly" is unclear because it is unclear how one side (i.e. the front side) of the flow field plate can define more than one chamber.

In response, the Applicant respectfully submits that it is possible for the flow field plate to define more than one chamber and this has been clearly explained by the Applicant above. There are two types of chambers; one type of chamber refers to the channels used for reactant gas flow and the other type of chamber refers to the network of sealing grooves. Accordingly, the Applicant submits that this limitation is clear.

In paragraph 12 of the Office Action, the Examiner further argued that in claims 1 and 10, the limitation "at least two apertures for a reactant gas for supply to said chambers" is indefinite because it is unclear what these chambers are since one surface of the flow field plate cannot define more than one chamber.

In response, the Applicant has amended claims 1 and 10 to restate the limitation as "at least two apertures for a reactant gas for supply to said chambers to provide for reactant gas flow adjacent to the membrane electrode assembly".

In paragraph 12 of the Office Action, the Examiner further argued that in claim 1, the limitation "at least one slot extending through the flow field plate from the back side to the front side thereof, to provide communication between the corresponding extension and the reactant gas flow channels " is indefinite because it is unclear how slots can

provide communication between the corresponding extension and the reactant gas flow channels.

In response, the Applicant has amended claim 1 to recite the limitation that "for each aperture associated with the reactant gas that flows in the reactant gas flow channels, a plurality of slots extending through the flow field plate from the back side to the front side thereof, the plurality of slots being disposed adjacent to the extension on the rear side of the flow field plate and adjacent to the reactant gas flow channels on the front side of the flow field plate to provide fluid communication between the corresponding extension and the reactant gas flow channels". The Applicant submits that the amendments made in claim 1 now clearly state that the plurality of slots are connected to both the extension, on the rear side of a flow field plate, and the reactant gas flow channels, on the front of a flow field plate, to provide fluid communication therebetween.

In paragraph 12 of the Office Action, the Examiner also argued that in claim 9, the limitations "a first extension, providing communication between the first apertures thereof and said first slots" and "a second extension, providing communication between the second apertures thereof and said second slots" is indefinite because it is unclear what this communication is.

In response, the Applicant has amended claim 9 such that the limitations referred to by the Examiner now read "a first extension disposed between the first aperture and the corresponding first slots for providing fluid communication therebetween" and "a second extension disposed between the second aperture and the corresponding second slots for providing fluid communication therebetween". The Applicant submits that the amendments made in claim 9 now clearly state that, on the rear side of the flow field plate, the extension is connected to an aperture and the corresponding slots to provide fluid communication therebetween.

In paragraph 12 of the Office Action, the Examiner rejected claim 10 and argued that the limitation "for each aperture, at least one slot extending through the flow field plate

from the back side to the front side thereof, to provide communication between the corresponding extension and the reactant gas flow channels" is indefinite because it is unclear what this communication is.

In response, the Applicant has amended claim 10 such that the limitation referred to by the Examiner now reads "for each aperture associated with reactant gas that flows in the reactant gas flow channels, at least one slot extending through the flow field plate from the back side to the front side thereof, the at least one slot being disposed adjacent to the extension on the rear side of the flow field plate and adjacent to the reactant gas flow channels on the front side of the flow field plate to provide fluid communication between the corresponding extension and the reactant gas flow channels. The Applicant submits that the amendments made in claim 10 now clearly state that the at least one slot is connected to both the extension, on the rear side of a flow field plate, and the reactant gas flow channels, on the front of a flow field plate, to provide fluid communication therebetween.

In paragraph 12 of the Office Action, the Examiner also rejected claim 11 and argued that the limitation "for each of the first apertures thereof, on the rear side thereof, a first extension, providing communication between the first apertures thereof and said first slots" and "a second extension, providing communication between the second apertures thereof and said second slots" is indefinite because it is unclear what this communication is.

In response, the Applicant has amended claim 11 such that the limitations referred to by the Examiner now read "a first extension disposed between the first aperture and the corresponding first slots for providing fluid communication therebetween" and "a second extension disposed between the second aperture and the corresponding second slots for providing fluid communication therebetween". The Applicant submits that the amendments made in claim 11 now clearly state that, on the rear side of the flow field plate, the extension is connected to an aperture and the corresponding slots to provide fluid communication therebetween.

In paragraph 12 of the Office Action, the Examiner also rejected claim 14 and argued that the limitation "at least two apertures for a reactant gas supply to one of said chambers" is indefinite because it is unclear what these chambers are since one surface of the flow field plate cannot define more than one chamber.

In response, the Applicant has amended claim 14 such that the limitation referred to by the Examiner now reads "at least two apertures for a reactant gas for supply to a portion of said chambers which provide for reactant gas flow adjacent to the membrane electrode assembly". As previously explained, the Applicant submits that it is possible for the flow field plate to define more than one chamber. In particular, there are two types of chambers; one type of chambers refers to the channels used for reactant gas flow and the other type of chambers refers to the network of sealing grooves. The Applicant has amended claim 14 to state that the apertures provide the reactant gas to the portion of the chambers that provide reactant gas flow along the membrane electrode assembly. Accordingly, the Applicant submits that this limitation is clear.

In paragraph 12 of the Office Action, the Examiner further rejected claim 14 on the basis that the limitation "wherein each of the plurality of slots provides communication between the corresponding extension and reactant gas flow channels" is indefinite because it is unclear what this communication is.

In response, the Applicant has amended claim 14 such that the limitation referred to by the Examiner now reads "wherein each of the plurality of slots is disposed adjacent to the extension on the rear side of the flow field plate and adjacent to the reactant gas flow channels on the front side of the flow field plate to provide fluid communication between the corresponding extension and reactant gas flow channels." The Applicant submits that the amendments made in claim 14 now clearly state that the slot is connected to both the extension, on the rear side of a flow field plate, and the reactant gas flow channels, on the front of a flow field plate, to provide fluid communication therebetween.

Claim Rejections – 35 USC S. 102

In paragraph 14 of the Office Action, the Examiner rejected claims 1-14 under 35 U.S.C. 102(e) as being anticipated by Marvin et al. (U.S. 6,500,580 B1). In particular, the Examiner highlighted Figures 1-5; col. 2, lines 5-20; col. 3, lines 35-58; col. 4, lines 8-45; and col. 5, lines 19-27 of Marvin et al.

In paragraph 15 of the Office Action, the Examiner rejected claims 1-14 under 35 U.S.C. 102(e) as being anticipated by Matlock et al. (U.S. 6,261,711 B1). In particular, the Examiner highlighted Figures 1-3 and 5; col. 3, lines 10-39; col. 4, lines 64-67; col. 5, lines 4-63; and col. 7, lines 15-27 of Matlock et al.

In paragraph 16 of the Office Action, the Examiner rejected claims 1-14 under 35 U.S.C. 102(e) as being clearly anticipated by Yosida et al. (U.S. 6,566,001 B2).

In response, the Applicant respectfully submits that the cited references do not anticipate claims 1 to 19 as amended herein. In particular, each of independent claims 1, 9, 11 and 14 in the subject application recite at least one flow field plate having an aperture associated with (i.e. providing or removing) a reaction gas that flows in reaction gas flow channels in the front of the flow field plate. The aperture includes an extension on the rear side of the plate which is adjacent to a plurality of slots that extend from the back of the flow field plate to the front of the flow field plate. The plurality of slots are adjacent to the reaction gas flow channels on the front side of the flow field plate. The plurality of slots and the extension thereby provide fluid communication between the aperture, on the rear of the flow field plate, and the reaction gas flow channels on the front of the flow field plate. Claim 10 is similar except for the recitation of "at least one slot".

Of note, the extension recited in claims 1, 9, 10, 11 and 14 provides a separation between the aperture and the corresponding slot(s) thereby providing a gradual transition for gas flow, from the much larger sized aperture to the smaller sized slot(s). The Applicant submits that none of the cited references provide this feature. In particular, Marvin (see Figure 3), Matlock (see Figure 3) and Yosida (see Figure 4) all depict flow channels that directly connect to an aperture. These flow channels then extend from the back of the flow field plate to the front of the flow field plate and connect, in a one-to-one fashion to reaction gas flow channels on the front of the flow field plate. Accordingly, in each of these cited references, a much larger aperture is directly connected to the smaller-sized channels. Further, each of the cited references in no way teaches or hints at using an extension as taught and claimed in the subject application.

Accordingly, the Applicant respectively submits that independent claims 1, 9, 10, 11 and 14 are clearly not anticipated by the cited references and should be allowed. Further, since claims 2-8 and 15 depend either directly or indirectly from claim 1, claims 16 and 17 depend directly from claim 9 and claims 12, 13 and 18 depend either directly or indirectly from claim 11, as well the fact that each of these claims provide other patentable features, the Applicant respectfully submits that claims 2-8, 11-13 and 16-18 are not anticipated by the cited references and should be allowed.

The Applicant further submits that the extension, as described and claimed in the subject application, is not obvious in light of the cited references. The cited references do not teach this feature or even suggest adding such a feature to a flow field plate. Further, the extension feature provides a number of unobvious advantages. Firstly, the extension provides a gradual geometrical transition for the flow path that the reactant gas follows between the aperture and the corresponding slots. This improves the gas flow velocity profile since the reactant gas flows more smoothly between the aperture and the corresponding slots. This is in contrast to the cited references in which the gas flow is turbulent because the reactant gas is immediately forced into smaller flow channels from a much larger aperture. Accordingly, the channels that directly connect to

the aperture in the cited references will experience a higher temperature and will more quickly degrade which will result in the more frequent replacement of the cited flow field plates. In contrast, the extension of the subject application provides a smoother flow of reactant gas which results in a longer lifetime for the flow field plate of the subject application as well as other benefits.

In addition, with respect to independent claims 10 and 11, the Applicant has claimed that each extension is provided with a plurality of projections that are offset from the corresponding aperture and define flow channels that extend from the apertures to the plurality of slots. The Applicant submits that this feature is clearly not taught or suggested by any of the cited references. This feature is advantageous for the same reasons given above, namely the fact that there is a gradual geometrical transition between the aperture and the flow channels defined by the projections. In particular, the flow channels stop short of the aperture (i.e. there is an aperture extension) which is in direct contrast to the flow channels shown in the cited references.

This feature of multiple projections is also advantageous for the reason that it addresses the problem of improving support for the sealing means at the flow channels on the rear side of the flow field plate, especially for larger fuel cell stacks. Further, these projections can be part of the flow field plate and therefore can be manufactured in the same step which reduces fabrication costs. Furthermore, the area dedicated to sealing is smaller due to the use of multiple projections.

In addition, for the aperture that delivers the reactant gas to the rear of the flow field plate, it is known that the pressure distribution of the reactant gas flow is not constant along the length of the aperture (i.e. the side of the aperture that is adjacent to the back-side feed channels). The back-side feed structure taught by the cited references, does not compensate for this imbalance in pressure distribution since the flow channels are directly connected to the aperture. Accordingly, for the cited references, the pressure imbalance is seen in the reactant gas that flows within each back-side feed channel. Further, this imbalance in pressure distribution is transmitted to the front of the flow field

plate where the reactant gas flow channels. The end effect is a reduction in the efficiency of the electrochemical cells of the cited references.

In contrast to the cited references, the extension associated with the aperture, which is in between the aperture and the back-side feed channels (i.e. the multiple projections), as claimed in the subject invention, has a normalizing effect on the pressure distribution that exists along the length of the aperture that is adjacent the aperture extension. Accordingly, in the Applicant's claimed invention, before the reactant gas reaches the back-side feed channels, as defined by the multiple projections, the "pressure head" of the reactant gas flow is normalized so that the reactant gas flow in each back-side feed channel has approximately the same pressure and consequently there is a normalized flow distribution across the back-side feed channels, as previously mentioned. This effect carries through to the reactant gas flow in the reactant gas channels on the active side of the flow field plate. The end result is improved efficiency for the operation of the electrochemical cell of the claimed invention.

In addition, with respect to claims 14-16 and 18, the Applicant has claimed that each of the plurality of slots is connected to more than one of the reactant gas flow channels. This feature is not taught or suggested by the cited references. Rather, the cited references show a direct one-to-one correspondence between the back-side feed channels and the reactant gas flow channels on the front of the flow field plate. The Applicant submits that this claimed feature is beneficial since, if one of the reactant gas flow channels is blocked, the slots in the subject application can provide the reactant gas flow to another reactant gas flow channel whereas in the cited references, a blocked back-side feed channel will result in a greater pressure for the reactant gas that flows through the remaining back-side feed channel which will further degrade the gas flow velocity profile and increase the rate of degradation of the cited flow field plate.

CONCLUSION

In view of the foregoing comments, it is respectfully submitted that the application is now in condition for allowance. If the Examiner has any further concerns regarding the language of the claims or the applicability of the cited references, the Examiner is respectfully requested to contact the undersigned at 416-957-1603.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

FRANK et al.

By _____
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Attachments

Appendix for the Figures

VERSION SHOWING AMENDMENTS

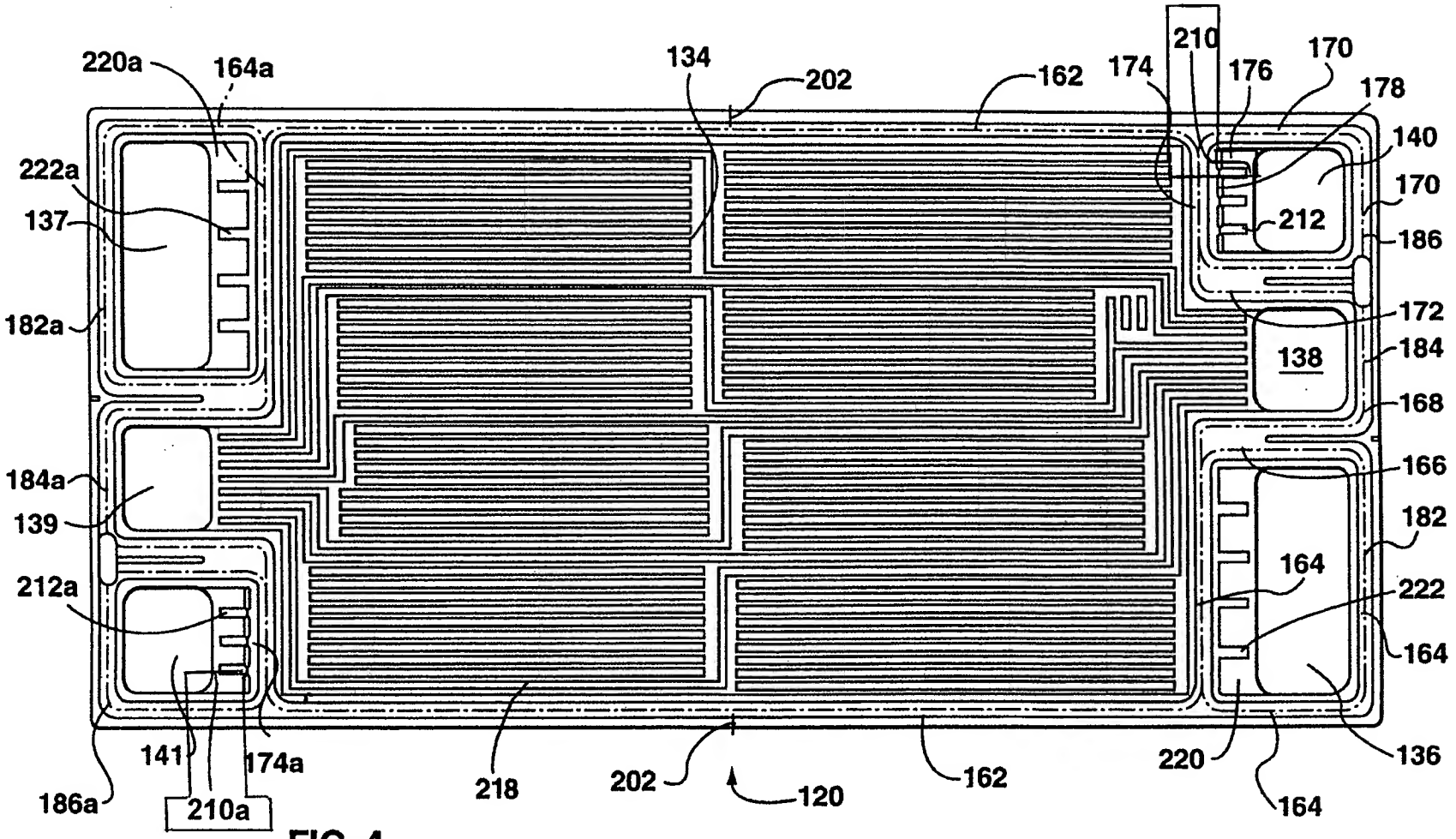

FIG. 4

VERSION SHOWING AMENDMENTS

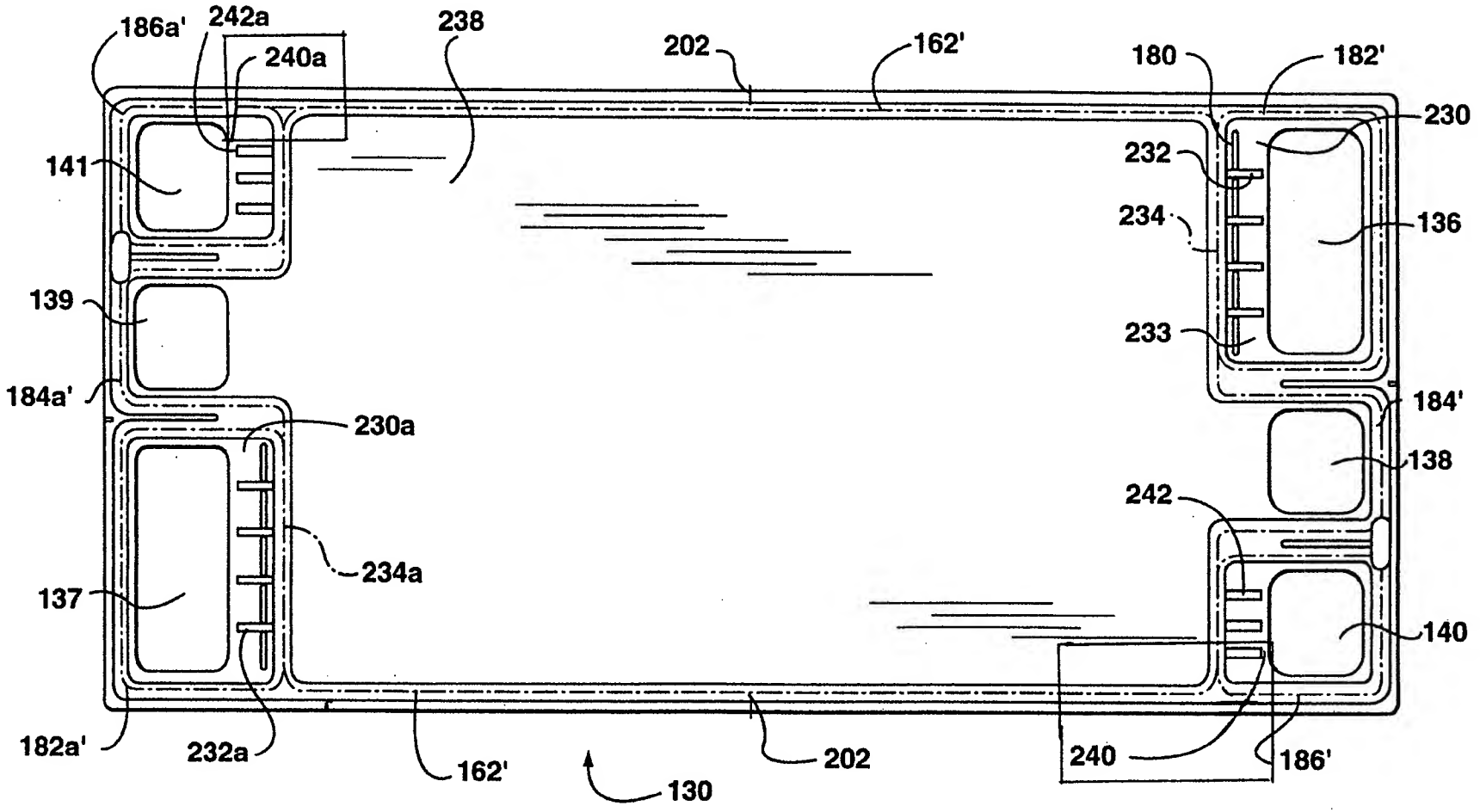

FIG. 8